

# IDAHO DEPARTMENT OF FISH & GAME

Jerry M. Conley, Director

Hayden Creek Hatchery

Annual Report



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by

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## Hayden Creek Hatchery

### ABSTRACT

This year we produced 20,788.3 pounds of fish at a feed cost of \$7,802.66. We took over 191,200 eggs and received over 1,255,000 eyed eggs from the Cowlitz and Pahsimeroi Hatcheries. The total fish planted for the year was 1,769,202, and they weighed a total of 34,207.3 pounds.

We conducted a chinook smolt imprinting experiment with morpholine but no results will be available for two years.

Adult chinook returns were about what we expected, with 88 returning.

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## OBJECTIVES

To investigate and explore various methods and techniques of rearing chinook salmon to the smolt stage in dirt bottomed ponds.

To determine those rearing and handling procedures that maximize the quality and quantity of smolt and promote maximum smolt survival and adult contribution and returns.

## INTRODUCTION

The Hayden Creek Hatchery was established in the 60's as an experimental station to work with the pond rearing of steelhead. In 1969 some work was begun with chinook salmon. Beginning with the spring release in 1979, all steelhead smolt releases were discontinued and chinook salmon smolt production became the priority.

In the spring of 1981 the hatchery went from a two man to a one man station. On July 1, 1981 the station was transferred from research to hatcheries.

The hatchery is located about 3.5 miles southwest of the Lemhi, Idaho, Post Office and store. The elevation is above 5,000 feet. The facility consists of two .6-acre ponds, two 200-foot raceways and an egg house with ten 16-tray Heath stack-type incubators. The water sources are from Hayden Creek and a large spring that flows about eight cubic feet of water per second. The creek temperature varies from 32° F to 65° F while the average spring temperature is nearly constant at around 52° F.

## FISH PRODUCTION

Fish production for the station is summarized in Table 1.

## FISH HEALTH

With the construction of a larger headrace for the Hayden Creek water supply in 1979 and a change in rearing practices disease at the hatchery has ceased to be a problem.

Prior to the aforementioned changes, bacterial gill and costia were constant problems. From the time the fish were put in the raceways until they were removed, treatments of Purina 4X and Formalin were regular occurrences. The disease and treatments were the causes of high mortality for many years.

## FISH TRANSFERS

The station did not transfer any fish or eggs during the year. We did, however, receive spring chinook eggs from the Cowlitz Hatchery in Washington and steelhead eggs from the Pahsimeroi Hatchery. The numbers received are shown in Table 1.

## FISH RELEASES

The fish released data is summarized by species in Table 2, "Fish Planted." We planted a total of 1,796,198 fish that weighed 34,207 pounds.

Table 1.

## Fish Production

Parent stock or species	Number on hand at start of year			Received or taken during year	Number planted during year			Number on hand at end of year			Pounds produced
	eggs	fish	pounds		eggs	fish	pounds	eggs	fish	pound	
Rapid River Hayden Creek Spring Chinook		656,419	13,848			606,000	31,237				17,389
Cowlitz Spring Chinook				571,563	548,520	2,800					2,800
Hayden Creek Spring Chinook	27,348			112,115				96,300	17,971	421	421
Pahsimeroi Steelhead Class A				521,472	423,478	95.6					95.6
Pahsimeroi Steelhead Class B				162,641	143,761	49.5					49.5
Hayden Creek Steelhead Class B				79,153	74,443	25.2					25.2
Totals	27,348	656,419	13,848	1,446,944	1,796,202	34,207.3		96,300	17,971	421	20,780.3

Table 2.

## Fish Planted

Parent stock or species	Number rel eased	Size at release	Pounds released'	Receiving area	Receiving water
Rapid River Hayden Creek Spring Chinook	606,000	19.4/1b	31,237	Region 6	Hayden Creek
Cowlitz Spring Chinook	548,520	195.9/1b	2,800	Region 2	White Sands Cr.
Pahsimeroi Steelhead Class A	366,478 57,000	4,415.4/1b 4,528.0/1b	83 12.6	Region 6 Region 6	Lemhi River Bear Valley Cr.
Pahsimeroi Steelhead Class B	143,760	2,898.4/1b	49.6	Region 6	Lemhi Big Springs Creek
Hayden Creek Steelhead Class B	74,440	2,954.0/1b	25.2	Region 6	Lemhi Big Springs Creek
Totals	1,796,198		34,207.4		

## ADULT RETURNS

### Spring Chinook

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A total of 88 adult spring chinook salmon returned to the Hayden Creek trap between 13 June and 9 September 1981. We classified 5 adults as 1-ocean third year of life fish, 48.3-61.0 cm (19-24 in) in length and 83 as 2-ocean fourth year of life returnees, 61.0-83.8 cm (24-33 in) in length for females and 61.0-83.8 cm (24-35 in) in length for males (Table 3). Out of the returning adults we found that 19 were adipose fin clipped. These fin clipped fish only contained one third year of life fish. The snouts were recovered at spawning time and were sent to the Lewiston, Idaho coded wire tag recovery lab for reading, (we lost five clipped fish to thieves).

A total of 13 adult chinook were stolen from the holding pens on the night of 3 July 1981. It is believed that all of these fish were males, unless mistakes were made in sorting.

### Steel head

There were 34 adult steelhead that returned to the Hayden Creek trap between 11 March to 7 May 1981 (Table 4). All but one were classified as two-ocean returnees.

We calculate a release-to-return percentage of .014 for the April 1977 release of 236,300 steel head smolts. Due to the drought of 1977, that year was the only one that steelhead redd counts were possible in Hayden Creek. The results of those counts showed that at least a ratio of three adults bypassing for every one entering the hatchery. If this holds true for this year, the percent of returnees should have been around .04%.

Sixteen females were spawned for a total of 79,153 eggs. These eggs were incubated on Hayden Creek water at 3-15° C (38-58° F). Button-up started in mid-May and finished in late June. The resultant 64,217 swim-up fry were planted in Big Springs Creek near Leadore, Idaho.

It is believed that most of these adults were descendants of Clearwater stock steelhead. The lack of returns from Washington stocks planted in the past lead to this conclusion (Table 4).

### SPAWNTAKING

Parent stock or species	Number of females spawned	Number of green eggs	Percent eye-up	Number of eyed eggs
Rapid River Spring Chinook	33	112,115	85.9%	96,300
Clearwater Steelhead	16	79,153	94.0%	74,443
Totals	49	191,268		170,743

Table 3. Summary of spring chinook smolt releases and adult returns to Hayden Creek Hatchery since 1971.

Brood year	Year released		Number juveniles released	Number Marked	Mark used	River race	Numbers adults returned as:		
							one-ocean fish	two-ocean fish	three-ocean fish
1971	1972	(Oct)	312,000	73,000	RV, L Max	Rapid River	38 (1974)	120 (1975)	10 (1975)
1972	1973	(Oct)	151,000	0	---	Rapid River	27 (1975)	89 (1976)	4 (1977)
1973	1974	(Sept)	350,000	0	---	Rapid River	9 (1976)	45 (1977)	13 (1978)
1974	1975	(Oct)	276,000	0	---	Rapid River	5 (1977)	74 (1978)	7 (1979)
1974	1976	(April)	6,000	6,000	R Max	Rapid River	0 (1977)	0 (1978)	0 (1979)
1975	1976	(Sept)	255,000	0	---	Hayden Creek- Rapid River Mix	19 (1978)	(1979)	(1980)
1976	1977	(April)	99,000	9,600	AD-CWT	Rapid River	0 (1978)	(1979)	241 (1980)
1976	1977	(Sept)	86,000	86,000	AD-CWT	Hayden Creek- Rapid River Mix	0 (1979)	4 (1980)	— (1981)
1976.	1977	(Oct)	75,500	0	---	Hayden Creek- Rapid River Mix	3 (1979)	12 (1980)	(1981)
1976	1978	(April)	15,300	15,300	AD-CWT	Rapid River	3 (1979)	15 (1980)	— (1981)
1977	1979	(April)	176,500	58,200	AD-CWT	Rapid River	17 (1980)	83 (1981)	— (1982)
1978	1980	(April)	424,400	83,100	AD-CWT	Rapid River	5 (1981)	(1982)	— (1983)
1979	1981	(April)	606,000	103,000	AD-CWT	Hayden Creek- Rapid River Mix	— (1982)	(1983)	— (1984)



Table 4. Summary of steel head smolt releases and adult returns to Hayden Creek Research Station since 1970.

Brood year	Year released	Number juveniles released	Number marked	Mark used	River race	Number adults returned as:	
						one-ocean fish	two-ocean fish
1970	1971 (May)	72,000	38,000	LV	Lemhi weir, 1970 return	5 (1973)	17(1974)
1970	1972 (March)	87,500	50,000	LV	Lemhi weir, 1970 return	3 (1974)	2 (1975)
1971	1973 (April)	31,700	13,800	LV	Lemhi weir,	2 (1975)	23 (1976)
	1973 (Nov)	47,000 1971	0	--	Lemhi weir, 1972 return-	-21 (1976)	18 (1977)
1973	1974 (April)	80,000	0	--	Clearwater-		
1973	1975 (April)	229,000	0	--	Clearwater-Hayden Creek	6 (1977)	20 (1978)
1975	1976 (April)	125,000	0	--	washougal	0 (1978)	8 (1979)
1976	1977 (April)	100,000	100,000	CWT&AD	washougal	0 (1979)	0 (1980)
1976	1977 (April)	99,000	0	--	washougal	0 (1979)	0 (1980)
1977	1978 (April)	117,500	0	--	washougal	0 (1980)	(1981)
1977	1978 (April)	119,300	0	--	Clearwater	0 (1980)	— (1981)
1978	1979 (April)	59,300	0	--	washougal	—(1981)	— (1982)

#### FISH FEED UTILIZED

f	Manufacturer	Type of feed	Feed size	Pounds of feed fed	Cost
	Moore Clark	OMP	Starter	80	29.60
	Moore Clark	OMP	1/32 pellets	650	240.50
	Moore Clark	OMP	3/64 pellets	500	185.00
	Rangen	Dry	#3	400	115.00
	Rangen	Dry	#4	1,700	471.75
	Rangen	Dry	#5	250	57.88
	Rangen	Dry	3/32 pellets	31,850	6,702.93
	Totals			35,530	7,802.66

The total pounds of fish produced was 20,780.3 pounds. This results in a conversion rate of 1.71 pounds of feed per pound of fish flesh produced. Feed costs per pound of fish produced was \$.38.

#### SPECIAL STUDIES

##### Morpholine Experiment

Since the initial construction of the Hayden Creek adult collection facilities in the late 1960's, adult bypassing of the hatchery entrance has been a problem. Poor ladder attraction flows and spring seeps above the hatchery result in substantial portions of returning adults bypassing the facility and spawning in Hayden Creek in the vicinity of the station. Experiments with temporary weirs have not been successful.

Scholz (1973) demonstrated that coho salmon could be imprinted and returned back to a specific location with the use of the chemical morpholine at concentrations as low as  $5 \times 10^{-5}$  mg/l. In 1979 we initiated a morpholine-homing experiment at Hayden Creek to determine if the use of this imprinting chemical will help to reduce bypass of returning adults from the hatchery.

Between 3-16 March, 1980 a drip application of morpholine at a rate of 1 mg per 54 hr was metered into the north pond for a period of 303 hours (12 1/2 days) to imprint the spring chinook being reared in the pond. Prior to release of the chinook on 31 March, 41,600 were given an adipose clip and a coded wire tag. A similar number were also tagged in the adjoining untreated (south) pond as an experimental control.

In April 1981 we again imprinted spring chinook salmon smolts to morpholine. A drip application was applied to the south raceway at the same concentration ( $5 \times 10^{-5}$  mg/l) as in the previous experiment.

After the fish were tagged they were discharged into the south raceway with the morpholine present. In the raceway the fish were allowed to recuperate from the anesthetic used in tagging. The bottom raceway screen was removed so the smolts could migrate freely.

No specific exposure time could be calculated for each fish, but it is believed that most of the smolts were exposed to the morpholine for several hours.

The nonimprinted marked fish were handled in the same manner, but with no morpholine present.

Commencing in 1981 and continuing through 1984, morpholine concentrate will be dripped into the fish ladder leading to the station trap during the June-September adult chinook migration period. Returns of tagged fish to the station and recovery of kelts in Hayden Creek will allow us to determine the effectiveness of the chemical in attracting imprinted versus nonimprinted adults into the trap.

Return of wire tags from marked adults will help us determine if morpholine imprinted upper Salmon River-bound fish are attracted into lower Columbia River facilities using the chemical, or if excessive straying ensues compared to non-imprinted fish. We theorize that a strong attraction to the morpholine will not occur until the fish are on the final approach to their home tributary stream.

#### Egg Shocking Experiment

On 5 May 1981 an experiment was set up to determine the effect of electro-shocking on eggs. The eggs for the experiment were obtained from the Henrys Lake Hatchery near Ashton, Idaho.

The green water hardened eggs were transported in a milk can of ice water. They were placed in Vibert boxes for incubation. Shocking was to occur at 36, 150 and 45° temperature units.

Everything seemed to be going smoothly until the eggs were to be "cleaned up" at the eyed stage. On examination, all of the eggs for the experiment were found to be dead. Needless to say, that was the end of the project.

#### HATCHERY NEEDS

The hatchery is in need of some repair and new construction in order to take full advantage of production space.

The first priority for repair would be to replace the water lines to the egg house. One end of the spring supply has rusted through and was repaired in 1980. The intake from Hayden Creek needs to be remodeled to allow for better water control, especially during high water, low water, icing conditions and during fall leaf problem times.

The new construction list should include a silt settling box for the incubation water supply, a new adult holding facility and a theft alarm system, the alarm system to warn hatchery personnel of thefts during the night.

#### ACKNOWLEDGEMENTS

Hatchery staff during the year included Daniel J. Beers, Fish Hatchery Superintendent I; James Dean Myers, Fish Culturist; Claude R. Harris, Laborer; and Gary L. Anderson, Laborer. Dean Myers retired in March and was replaced by the laborers.

#### LITERATURE CITED

Scholz, Allen T. Olfactory imprinting in coho salmon: Behavioral and electrophysiological evidence. Laboratory of Limnology, University of Wisconsin, Madison, Wisconsin.